



POLITÉCNICA

INTERNATIONAL
CAMPUS OF
EXCELLENCE

COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001



E.T.S. de Ingenieros
Industriales

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

53001516 - Introduction to complexity economics

DEGREE PROGRAMME

05BD - Master Universitario En Ingenieria De La Organizacion

ACADEMIC YEAR & SEMESTER

2018/19 - Semester 1

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1. Description

1.1. Subject details

Name of the subject	53001516 - Introduction to complexity economics
No of credits	3 ECTS
Type	Optional
Academic year of the programme	Second year
Semester of tuition	Semester 3
Tuition period	September-January
Tuition languages	English
Degree programme	05BD - Master universitario en ingenieria de la organizacion
Centre	05 - Escuela Tecnica Superior de Ingenieros Industriales
Academic year	2018-19

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Rafael Ramos Diaz (Subject coordinator)	UD Economía	rafael.ramos@upm.es	Tu - 12:00 - 13:30

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

- Tecnología, organización y nuevos modelos de negocio digital
- Complejidad y redes: negocios en un mundo interconectado

3.2. Other recommended learning outcomes

- Economía

4. Skills and learning outcomes *

4.1. Skills to be learned

CB06 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

CB07 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio

CB08 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios

CE04 - Conocer las ciencias de la complejidad y las redes y sus efectos en sectores, industrias y modelos de negocio

CG05 - Conocer las tendencias predominantes en el entorno actual de las distintas políticas funcionales (marketing, producción, logística, finanzas, recursos humanos, liderazgo...)

CG06 - Conocer y aplicar las principales tramas conceptuales (frameworks) para el desarrollo de la estrategia de una organización y la gestión de los procesos de diseño, de gestión de la información y cambio de dicha organización

CG07 - Modelar diferentes problemas de diseño de las organizaciones, conocer y seleccionar técnicas de Ingeniería de Organización apropiadas, así como obtener, comunicar, discutir y aplicar los resultados correspondientes

CT01 - Aplica. Habilidad para aplicar conocimientos científicos, matemáticos y tecnológicos en sistemas relacionados con la práctica de la ingeniería

CT05 - Resuelve. Habilidad para identificar, formular y resolver problemas de ingeniería

CT08 - Entiende los impactos. Educación amplia necesaria para entender el impacto de las soluciones ingenieriles en un contexto social global

CT09 - Se actualiza. Reconocimiento de la necesidad y la habilidad para comprometerse al aprendizaje continuo

CT10 - Conoce. Conocimiento de los temas contemporáneos

CT11 - Usa herramientas. Habilidad para usar las técnicas, destrezas y herramientas ingenieriles modernas necesarias para la práctica de la ingeniería

CT12 - Es bilingüe. Capacidad de trabajar en un entorno bilingüe (inglés/español)

4.2. Learning outcomes

RA43 - Interpretar los estados financieros de las empresas y organizaciones

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

5. Brief description of the subject and syllabus

5.1. Brief description of the subject

The 'Great Recession' has been a challenge for conventional economics, and it has not stood well in the trial. Mainstream economics, what is taught in economics faculties and explained in textbooks, has not provided us with the means to anticipate, deal with and repair damages caused.

The proposal is to reconsider the foundations and give way to different perspectives and approaches that have been held as little more than singularities until now from the ranks of mainstream economics. Some of them are here long ago, but only now are gaining visibility and acceptance. Post-keynesian economics, behavioral economics, complexity economics, econophysics and evolutionary economics are some of the best regarded and promising proposals.

In this course we will examine the basics of complexity and evolutionary economics. With a duly warning: we do not have the answers yet, and there is a long journey ahead.

5.2. Syllabus

1. PART I. THE CURRENT FRAMEWORK: TRADITIONAL ECONOMICS

- 1.1. The fundamental questions: what is wealth? How it is created?
- 1.2. Conventional wisdom in economic thinking
- 1.3. The critique to conventional economics

2. PART II. A NEW FRAMEWORK: COMPLEXITY ECONOMICS

- 2.1. The new paradigm: the economy as a complex adaptive system
- 2.2. System dynamics: feedback, non-linearity and disequilibrium
- 2.3. Agents and their micro-motives
- 2.4. Networks: interdependence and adaptability
- 2.5. Emerging patterns: macro-behaviors

3. PART III. THE MECHANISM OF THE EVOLUTION AND THE CREATION OF WEALTH

- 3.1. Evolution as an algorithm
- 3.2. Design spaces: from games to economies
- 3.3. The technology design space
- 3.4. The organization design space
- 3.5. Economic evolution
- 3.6. A new definition of wealth: fit order

4. PART IV. A NEW VISION OF STRATEGY AND ORGANIZATION

- 4.1. Strategy and innovation: firms and markets
- 4.2. Organizations: what they are and why they exist
- 4.3. Components of the organization: people, structure, culture
- 4.4. A new look at finance

6. Schedule

6.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Other face-to-face activities	Assessment activities
1	I. The current framework: traditional economics Duration: 02:00 Lecture			
2	I. The current framework: traditional economics Duration: 02:00 Lecture			Test evaluación Online test Continuous assessment Duration: 00:15
3	II. A new framework: complexity economics Duration: 02:00 Lecture			Test evaluación Online test Continuous assessment Duration: 00:15
4	II. A new framework: complexity economics Duration: 02:00 Lecture			Test evaluación Online test Continuous assessment Duration: 00:15
5	II. A new framework: complexity economics Duration: 02:00 Lecture			Test evaluación Online test Continuous assessment Duration: 00:15
6	II. A new framework: complexity economics Duration: 02:00 Lecture			Test evaluación Online test Continuous assessment Duration: 00:15
7	III. The mechanism of the evolution and the creation of wealth Duration: 02:00 Lecture			Prueba evaluación continua Online test Continuous assessment Duration: 02:00
8	III. The mechanism of the evolution and the creation of wealth Duration: 02:00 Lecture			Test evaluación Online test Continuous assessment Duration: 00:15
9	III. The mechanism of the evolution and the creation of wealth Duration: 02:00 Lecture			Test evaluación Online test Continuous assessment Duration: 00:15
10	III. The mechanism of the evolution and the creation of wealth Duration: 02:00 Lecture			Test evaluación Online test Continuous assessment Duration: 00:15
11	III. The mechanism of the evolution and the creation of wealth Duration: 02:00 Lecture			Test evaluación Online test Continuous assessment Duration: 00:15

12	IV. A new vision of startegy and organization Duration: 02:00 Lecture			Test evaluación Online test Continuous assessment Duration: 00:15
13	IV. A new vision of startegy and organization Duration: 02:00 Lecture			Presentación trabajo equipo Group presentation Continuous assessment Duration: 02:00
14	IV. A new vision of startegy and organization Duration: 02:00 Lecture			Prueba evaluación continua Online test Continuous assessment Duration: 02:00
15				
16				
17				Examen final Written test Final examination Duration: 03:00

The independent study hours are training activities during which students should spend time on individual study or individual assignments.

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The subject schedule is based on a previous theoretical planning of the subject plan and might go to through experience some unexpected changes along throughout the academic year.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
2	Test evaluación	Online test	No Presential	00:15	3%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06 CT01 CG05
3	Test evaluación	Online test	No Presential	00:15	3%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06 CT01 CG05
4	Test evaluación	Online test	No Presential	00:15	3%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06

							CT01 CG05
5	Test evaluación	Online test	No Presential	00:15	3%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06 CT01 CG05
6	Test evaluación	Online test	No Presential	00:15	3%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06 CT01 CG05
7	Prueba evaluación continua	Online test	No Presential	02:00	15%	5 / 10	
8	Test evaluación	Online test	No Presential	00:15	3%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06 CT01 CG05
9	Test evaluación	Online test	No Presential	00:15	3%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10

							CB06 CB07 CB08 CG06 CT01 CG05
10	Test evaluación	Online test	No Presential	00:15	3%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06 CT01 CG05
11	Test evaluación	Online test	No Presential	00:15	3%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06 CT01 CG05
12	Test evaluación	Online test	No Presential	00:15	3%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06 CT01 CG05

13	Presentación trabajo equipo	Group presentation	Face-to-face	02:00	40%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06 CT01 CG05
14	Prueba evaluación continua	Online test	No Presential	02:00	15%	5 / 10	

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
17	Examen final	Written test	No Presential	03:00	100%	5 / 10	CT08 CT11 CT12 CG07 CE04 CT05 CT09 CT10 CB06 CB07 CB08 CG06 CT01 CG05

7.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.

7.2. Assessment criteria

La evaluación continua se articula del siguiente modo:

- Diez tests de evaluación al final de cada tema, con un peso conjunto de un 30%
- Dos pruebas de evaluación continua, con un peso conjunto de un 40%
- Presentaciones de trabajos en grupo con un peso de un 40%

La prueba de evaluación final será un examen escrito presencial.

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Eric D Beinhocker, The Origin of Wealth: The Radical remaking of Economics and What it Means for Business and Society, Harvard Business Review Press, 2007	Bibliography	
César Hidalgo, Why Information Grows: The evolution of Order, from Atoms to Economies, Basic Books, 2015	Bibliography	
Economics	Web resource	